

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
14 July 2005 (14.07.2005)

PCT

(10) International Publication Number
WO 2005/063779 A2

(51) International Patent Classification⁷: **C07F 9/38**

(21) International Application Number:
PCT/EP2004/014556

(22) International Filing Date:
22 December 2004 (22.12.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
MI2003A002582 23 December 2003 (23.12.2003) IT
MI2004A000080 22 January 2004 (22.01.2004) IT

(71) Applicant (*for all designated States except US*): **LYOGEN LIMITED** [CY/CY]; 24, Ayias Aikaterinis, Archangelos - Nicosia (CY).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **GRASSI, Simona** [IT/IT]; Via Balestrini, 18, I-21047 Saronno (IT). **VOLANTE, Anna** [IT/IT]; Via Clefi 4, I-20146 Milano (IT).

(74) Agents: **MINOJA, Fabrizio** et al.; Bianchetti Bracco Minoja S.r.l., Via Plinio, 63, I-20129 Milano (IT).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A PROCESS FOR THE PREPARATION OF ALKYL- AND ARYL-DIPHOSPHONIC ACIDS AND SALTS THEREOF

(57) Abstract: The invention relates to a process for the preparation of diphosphonic acids by reaction of a carboxylic acid with a mixture of phosphorous acid and phosphorus oxychloride in defined molar ratios and in the absence of solvents. The invention further relates to ibandronic acid monosodium salt in the amorphous form.



WO 2005/063779 A2